

## 181. Electricity from Solid Waste; Make city Green

A Proposal of Phull Goth as optimal location of Electricity generation from Solid Waste

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### Abstract

It is not an relaxed job to implement spotlessness due to waste products, the key solution to get rid of this waste is to generate the electricity, by burning the "Municipal solid waste" (MSW) as a fuel. MSW comprise of different utilized things (items), which are not ready to be utilized like households, crude materials and so on. The incinerator operation is intended for disposing of the solid waste to produce the electricity. As indicated by the US EPA "The most biologically strong organization of MSW is expert when these approaches are completed: source diminishes, reusing, treating the dirt and move in landfills or waste combustors last. Convincing environmental organization of MSW plants intends to dismiss toxics from the MSW-fuel and to control air sullyng surges from the WTE plants. The control of dangerous materials and air contamination are vital attributes of ecological conventions administering MSW fuelled electric generation. EPA then issues a new "Maximum Achievable Control Technology" rule pursuant to the Federal Clean Air Act for the waste-to-energy industry. The rule requires "maximum available pollution control technology" (including acid control scrubbers, bag house particulate controls and carbon injection systems), persistent checking of burning proficiency and intermittent stack testing for risky air discharges. In any case, since refuse is naturally a wasteful wellspring of fuel, WTE plant's mercury emanations contrast and coal plants on the premise of every kilowatt-hour-created by an office. The on location land use effects are for the most part equivalent to those of coal or oil fuelled plants. There are a few spots in the Pakistan, where we can present this innovation; this will help in cleaning of our territory and decreasing of the setback of power which is our most serious issue and this will be accomplished by finding plants in the territories like Phull Goth, which is close to the ocean port furthermore associated with the Baluchistan. The alleged waste item assembled from the Karachi and Baluchistan, if used at Phull Goth, it will contribute in decrease of load shading.

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**Keywords:** Environmental Impact; WTE; MSW; Solid Waste.

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### 1. Introduction

Pakistan, our country is surrounded by two noteworthy issues; Power deficiency and Environmental Pollution, which are constraint in the advancement of our nation. No nation can progress, without the correct utilization of source present in it. The people of Pakistan are confronting parcel of issues because of the lack of electric power. Deficiency of power brings forth social and financial issues, it exist since most recent 10 years now it achieves the level of 8000 megawatt [1] (May 21, 2011). As we know that the population of Pakistan reaches 18 crore [1], but with increase in population we have failed to increase the production of electrical power. With a people that are expanding at around 1.8% yearly as indicated by the 2011 World Bank's report, there is nonstop augmentation in the strong waste however unfortunately there isn't a sole city in Pakistan having appropriate strong waste administration framework (SWM) right from social occasion of strong waste up to the transfer.

As indicated by the Yale Environmental Performance Index 2016, Pakistan is at 148<sup>th</sup> position among 178 countries. Whereas, last year's World Health Organizations itemized Karachi (5) Peshawar (6) and Rawalpindi (7) in the top 20 most infested regions. If you ought to ever stay in Karachi, you would see the contamination problem is very unadorned. There are hundredths of spots where garbage is at upsetting levels. This is mostly small local businesses and household's rubbish that is governing the streets of the metropolitan city. Areas such as Gulshan-e-Iqbal, Clifton, FB Area, Nazimabad, North Nazimabad, Gulistan-e-Jauhar, North Karachi, FC Area, and others present a view of landfills.

Environment service study expresses that Pakistan produces yearly strong waste which is verging on around 20.024 million tons, which thusly turns out to be almost 59,000 tons every day. This study also exposed that the rate of waste generation on average changes from 0.23 kg/capita/day to 0.61 kg/capita/day in urban and rural parts respectively [2]. The study also disclosed that the development rate of solid waste generation is approximately 2.4% per annum [2]. The increase in household size in main cities, like Rawalpindi, Karachi, Hyderabad, Peshawar, Faisalabad etc., is the principal factor distressing the solid waste and its supervision at different phases. It is expected that, the population of above mentioned cities will become 2 times in the next coming 10 years. And as a result, the sum of leftover being produced ranges from 1.896 kg/house/day to 4.29 kg/house/day which rise per annum with corresponding to population growth (Pak-EPA). However, the frequency of solid waste assemblage in mentioned cities ranges from only 51% to 69% of the entire waste generated. Due to the pollution 4,400 deaths caused in Pakistan annually [3].

The numerous industrial sectors in Pakistan are disposing over 1,500 tons of sewages every day [3]. The flour mills, Oil and ghee mills, pharmaceutical industry, marble factories and plastic extrusion mills are all contributing in heavily poisoning the water. On the lower side no less than 204 assembling units in the nation need or have lacking offices for treatment of waste outflows.

The waste that is disposed without any treatment is utilizing space and is not of any use, it will be better for a country like Pakistan, which is at present facing serious issues of shortfall of Electricity to make use of that waste as fuel and generate Electricity. There are lot of locations, but Phull Goth which is in the Karachi, connecting Baluchistan and sea port will be reasonable.

### 1.1. Collection and Separation of Waste

Waste can be gathered round at a single point, i.e railway station in every single city. The waste then can be transmitted to the WTE plant, through the train. Because train is very easy and convenient transport means, at the railway station near to the plant we transport waste through the waste carrying vehicle. At the plant site we first separate the waste into different types like; Plastic, Rubber, Glass, Metal, etc. We must make separate portion for different waste at collecting point, through this we will solve the problem of mixing of waste. This step can be solving by using the separation technology at each collecting point.

## 2. Methodology

The waste incoming at the plant must be assessed and quality-checked. There is a large storage, which is often premeditated to hold several days of waste carriages. An upstairs gantry switches the grip vessel and the leftover is unconfined into the feedstuff container, and after that it is being bolstered into the heater. The overhead gantry blends the leftover in the shelter previously exchanging that with the feedstuff container. In the heater, there is temperature around 1,000 °C, and no fuel other than the waste is required. The waste blazes under a flood of air before dropping onto a bed or mesh. The hot pipe gasses rise upwards. All ignitable material is eaten up. What is remaining is known as 'slag'. The slag drops down into a water-filled trench and is transported to be organized and reused.

There, the furnace water is dispersed and heated to steam by the hot flue gases. More the pressure and temperature of the steam more will be the potential for electricity production. In the meantime, expanded weight and temperature additionally prompt a more serious danger of erosion and expanded support costs. Due to the high temperature and steam pressure, it is possible to recover electricity, cooling and heat. The superheated steam is then sent to the turbine, which in turns drives the generator. In the generator, the kinetic energy of the turbine is converted into electrical power, which is supplied to the electricity network. The steam is then condensed into water and pumped back to the furnace. The water is then transferred back to the plant to be reheated.

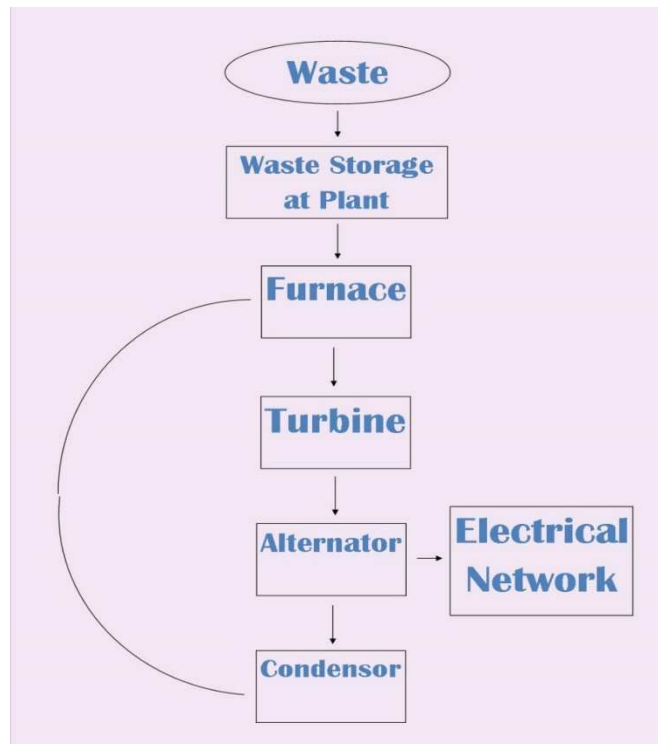


Fig.1. flow chart of the process

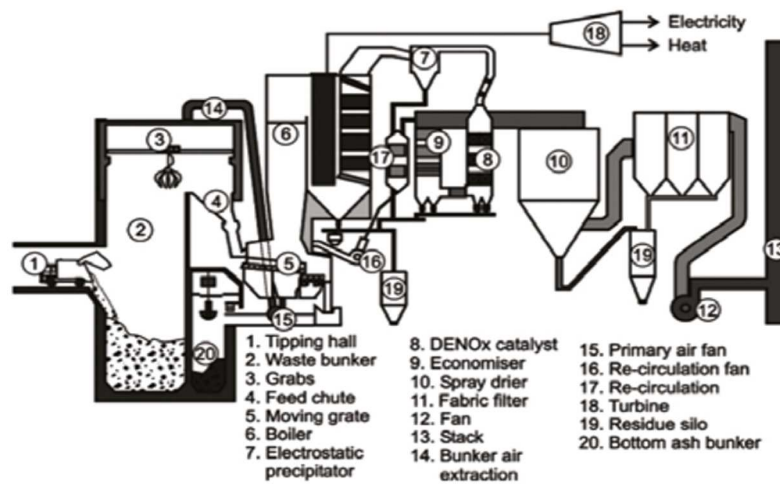


Fig.2. Diagram of Waste to Energy plant

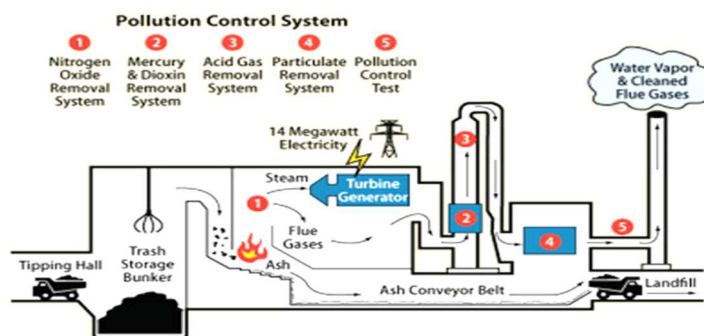


Fig.3. Diagram of Process

### 3. Benefits

There are economic and environmental benefits.

#### 3.1 Economic Benefits

The most critical monetary difference between WTE innovations and other ignition based vitality generation units is stringently related to the method for the data fuel. Waste has a negative quality, which is overseen by prefixed entryway costs, and is regularly considered, as the principal wellspring of pay for the WTE plant proprietors. In this sense, blazing offices have the basic role of waste treatment. Heat and the generation of power can be considered as a significant by item, with relative further wage. In addition, the transmission of Electrical Energy, from WTE plants is sorted out over other time units, thusly yielding a guaranteed pay structure in the midst of all operations.

As for development associated cost the early venture investment for the working of WTE unit assume an essential part on account of the enormous size of these offices and of the centre introduced segments. Capital expenses, in any case, can change on a very basic level as a component of the picked shapes for the treatment of vent gasses and other made form ups. Upkeep and operation costs have mediocre impact on the aggregate uses of the office and are fundamentally related to the measure of treated waste.

#### 3.2 Environmental Benefits

The waste part will diminish its transmissions of nursery gasses by 76% amid the years 1990-2020, rendering to the Climate Committee's figure. [4]

Notwithstanding waste start expanding, outflows have fallen. For example, releases of generous metals from waste blazing into the air have fallen by right around 99% since 1985. Besides, total spreads of dioxins from most of the country's waste blazing plants have tumbled from around 100 g to under 1 gram in the midst of the same time allotment. [5]

Aside from vent gasses that are utilized to deliver weight and warmth in the smoldering plant, the other essential consequence of the technique contains solid developments, generally as base red hot flotsam and jetsam or slag and fly powder; some of which can be reused in applications, for example, filling in the building and development businesses.

### 4. Biomass Plants in the World

There are more than 2,500 incineration plants in the world, which are allocated as follows:

- Round about 2,000 plants in the Asia.
- Nearly 460 plants in the Europe.
- About 100 plants in the America.
- And almost about 10 in the other part of the Earth. [7]

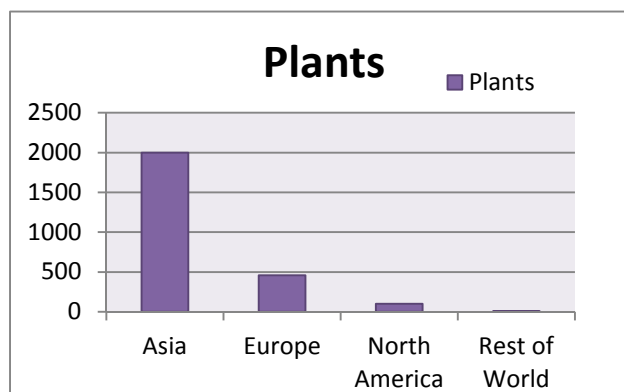


Figure.4. Plants all over the world

## 5. Contribution and the Proposal

Karachi is most populated city and produce more waste and it is also nearer to the sea, which is very helpful for the WTE plants, Plant can be installed near the Phull Goth, because it near to the sea, where we can also collect the Baluchistan waste for this plant through the sea route.



Fig.5. Location for the plant

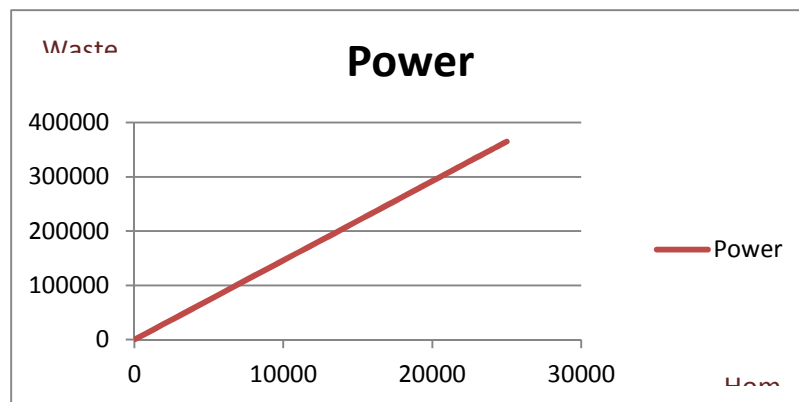


Fig.6. Electricity

The main advantage of this particular place is that it is at the outskirts of the city and there isn't much population in that area. As Karachi as a metropolitan city; a city where there are lots of industries, so, the waste from those industries can easily be sent to the proposed place. Karachi is the city having most of waste management companies so they will come in action too. The waste would approximately be 365,000 tons per year and that will be sufficient for powering 25,000 homes.

## 6. Conclusion

There are many other crises in Pakistan, but power shortage and pollution are the major ones, which gives birth to the other crises. We propose a possible way out for these both crises, its name is WTE plant, which produces electricity from the solid waste by burning it, it heat up the water and water became steam, which run the turbine and then turbine generate the electricity. The location for the plant is very useful because it fulfils the environmental requirements for the plant, the dumping place for the ash and water for the plant. It will also provide power to about 25,000 homes and it is also suitable for the waste collecting point of view.

## 7. Recommendation

WTE technology is very advantageous for the Pakistan, because this technology solve our both the issues, shortage of power and Pollution. The location which I suggested for the plant, that is very best for this plant because at that place we can collect the waste of Baluchistan through the sea route and waste of other provinces through the train service, and we can dump the ash in the sea easily.

So far till now Phull goth is the best proposed place for the installation of plant as it covers whole of the Karachi, Thatta, Baluchistan and other parts of the Sindh. It is also nearer to the sea port which is an added advantage. By this installation about 25000 homes will be enlightened with Power.

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